

be possible to develop the well successfully. A properly chosen screen allows the fine material to be pumped out, leaving a bed of coarse gravel and sand that provides a highly porous and permeable water-gathering area.

The final step is to fill in the starting borehole with puddle clay or, if clay is not available, with well-tamped earth. Make a solid, water-proof pump platform (concrete is best) and provide a place for spilled water to drain away.

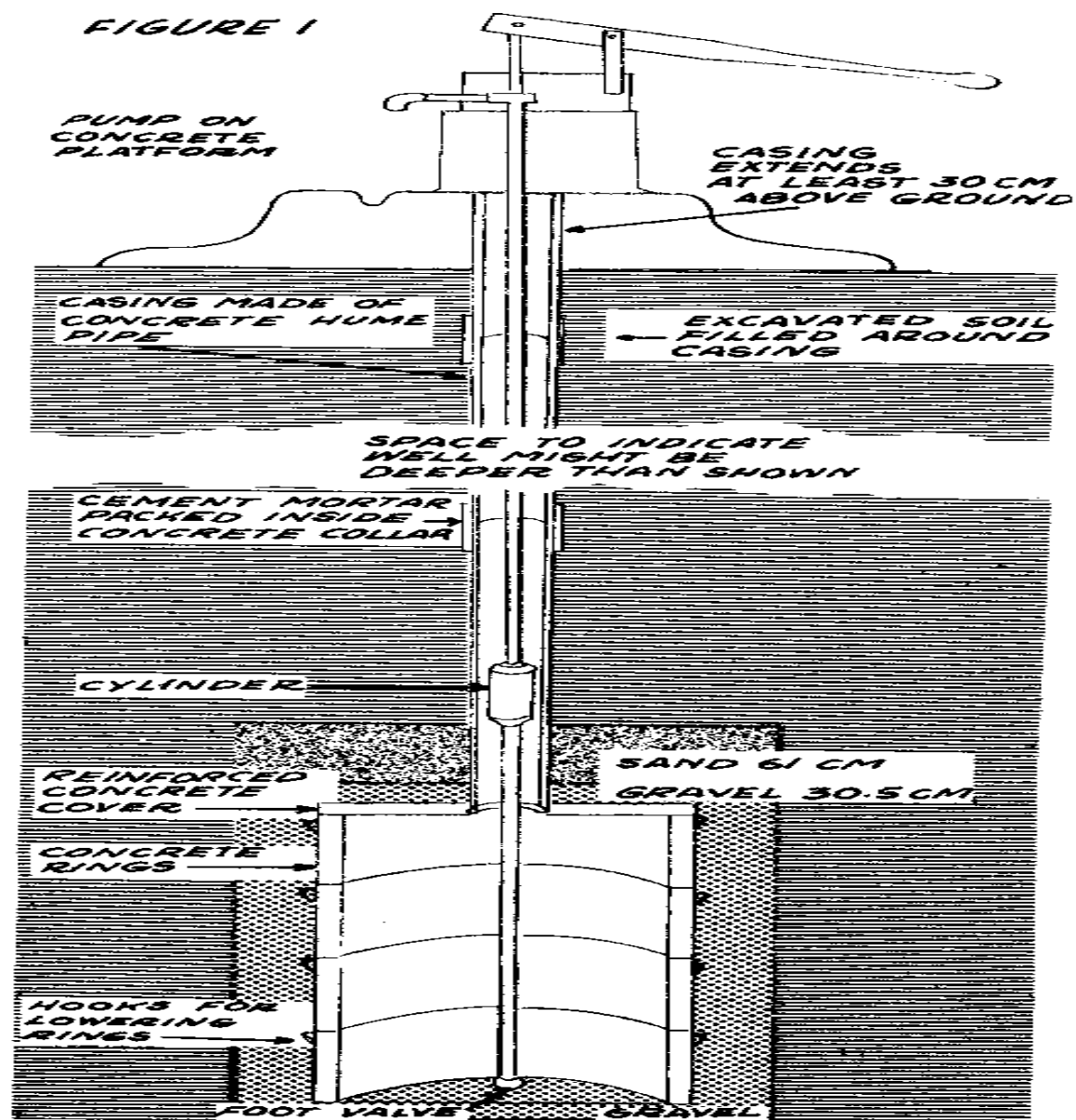
Source:

Wagner, E.G. and Lanoix, J.N. Water Supply for Rural Areas and Small Communities.

Geneva: World Health Organization, 1959.

DUG WELLS <see figure 1>

fig1x54.gif (600x600)



A village well must often act as a reservoir, because at certain hours of the day

the demand for water is heavy, whereas during the night and the heat of the day there is no call on the supply. What is suggested here is to make the well large enough to allow the water slowly percolating in to accumulate when the well is not in use in order to have an adequate supply when demand is heavy. For this reason wells are usually made 183 to 213cm (6' to 7') in diameter.

Wells cannot store rainy season water for the dry season, and there is seldom any reason for making a well larger in diameter than 213cm (7').

The depth of a well is much more important than the diameter in determining the amount of water that can be drawn when the water level is low. A deep, narrow well will often provide more water than a wide shallow one.

Remember that tubewells are much easier to construct than dug wells, and should be used if your region allows their construction and an adequate amount of water can be drawn from them during the busy hours (see section on Tubewells).

Deep dug wells have several disadvantages. The masonry lining

needed is very expensive. Construction is potentially very dangerous; workers should not dig deeper than one and a half meters without shoring up the hole. An open well is very easily contaminated by organic matter that falls in from the surface and by the buckets used to lift the water. There is an added problem of disposing of the great quantity of soil removed from a deep dug well.

### Sealed Dug Well

The well described here has an underground concrete tank that is connected to the surface with a casing pipe, rather than a large-diameter lining as described in the preceding entry. The advantages are that it is relatively easy to build, easy to seal, takes up only a small surface area, and is low in cost.

Many of these wells were installed in India by an American Friends Service Committee team there; they perform well unless they are not deep enough or sealed and capped properly.

## Tools and Materials

4 reinforced concrete rings with iron hooks for lowering, 91.5cm (3') in diameter

1 reinforced concrete cover with a seating hole for casing pipe

Washed gravel to surround tank: 1.98 cubic meters (70 cubic feet)

Sand for top of well: 0.68 cubic meters (24 cubic feet)

Concrete pipe: 15cm (6") in diameter, to run from the top of the tank cover to at

least 30.5cm (1') above ground

Concrete collars: for joints in the concrete pipe

Cement: 4.5kg (10 pounds) for mortar for pipe joints

Deep-well pump and pipe

Concrete base for pump

Tripod, pulleys, rope for lowering rings

Special tool for positioning casing when refilling, see "Positioning Casing Pipe,"

below

Digging tools, ladders, rope

A villager in Barpali, India, working with an American Friends Service Committee unit there, suggested that they make a masonry tank at the bottom of the well, roof it over, and draw the water from it with a pump. The resulting sealed well has many advantages:

- o It provides pure water, safe for drinking.
  
- o It presents no hazard of children falling in.

- o Drawing water is easy, even for small children.
- o The well occupies little space, a small courtyard can accommodate it.
- o The cost of installation is greatly reduced.
- o The labor involved is much reduced.
- o There is no problem of getting rid of excavated soil, since most of it is replaced.
- o The casing enables the pump and pipe to be easily removed for servicing.
- o The gravel and sand surrounding the tank provide an efficient filter to prevent silting, allow a large surface area for percolating water to fill the tank, and increase the effective stored volume in the tank.

On the other hand, compared to a well where people draw their own buckets or other containers of water, there are three minor disadvantages: only one person can pump at a time, the pump requires regular maintenance, and a certain amount of technical skill is required to make the parts used in the well and to install them properly.

A well is dug 122cm (4') in diameter and about 9 meters (30') deep. The digging should be done in the dry season, after the water table has dropped to its lowest level. There should be a full 3 meter (10') reaccumulation of water within 24 hours after the well has been bailed or pumped dry. Greater depth is, of course, desirable.

Spread 15cm (6") of clean, washed gravel or small rock over the bottom of the well. Lower the four concrete rings and cover into the well and position them there to form the tank. A tripod of strong poles with block and tackle is needed to lower the rings, because they weigh about 180kg (400 pounds) each. The tank formed by the rings and cover is 183cm (6') high and 91.5cm (3') in diameter.

The

cover has a round opening which forms a seat for the casing pipe and allows the suction pipe to penetrate to about 15cm (6") from the gravel bottom.

The first section of concrete pipe is positioned in the seat and grouted (mortared)

in place. It is braced vertically by a wooden plug with four hinged arms to brace

against the sides of the wall. Gravel is packed around the concrete rings and over

the top of the cover till the gravel layer above the tank is at least 15cm (6") deep. This is then covered with 61cm (2') of sand. Soil removed from the well is then shoveled back until the shaft is filled within 15cm (6") of the top of the first section of casing. The next section of casing is then grouted in place, using

a concrete collar made for this purpose. The well is filled and more sections of casing added until the casing extends at least 30cm (1') above the surrounding soil level.

The soil that will not pack back into the well can be used to make a shallow hill

around the casing to encourage spilled water to drain away from the pump. A concrete cover is placed on the casing and a pump installed.

If concrete or other casing pipe cannot be obtained, a chimney made of burned bricks and sand-cement mortar will suffice. The pipe is somewhat more expensive, but much easier to install.

Source:

A Safe Economical Well. Philadelphia: American Friends Service Committee, 1956 (Mimeographed) .

### Deep Dug Well

Untrained workers can safely dig a deep sanitary well with simple, light equipment, if they are well supervised. The basic method is outlined here.

### Tools and Materials

Shovels, mattocks

Buckets

Rope--deep wells require wire rope

Forms--steel, welded and bolted together

Tower with winch and pulley

Cement

Reinforcing rod

Sand

Aggregate

Oil